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## Winter Summary 2009-2010

Overall, this past winter was much drier than normal. With a moderate El Nino in place (tied for the 4<sup>th</sup> strongest El Nino since 1950) much of the Northern Rockies was missed in terms of precipitation. With the jet stream digging far south into California and the southwest U.S., the majority of the strong winter storms, which would usually produce abundant mountain snow, missed the region. In fact, mountain snowpack ranged from only 50 to 75% of normal, as of April 1st.

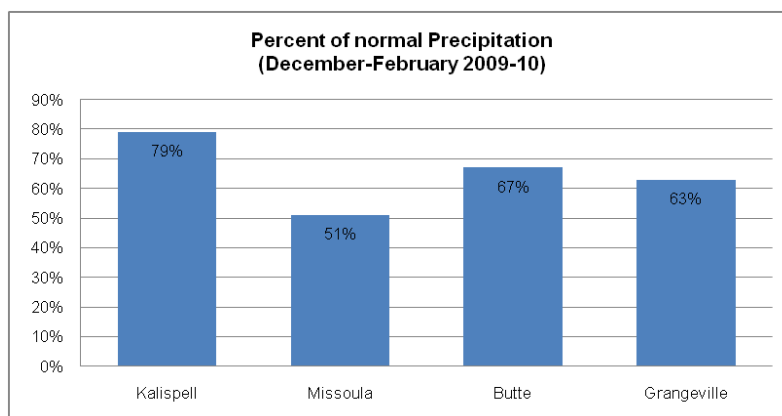


Lolo Pass: Feb 8<sup>th</sup>, 2008  
120% of normal snowpack



Lolo Pass: Feb 8<sup>th</sup>, 2010  
53% of normal snowpack

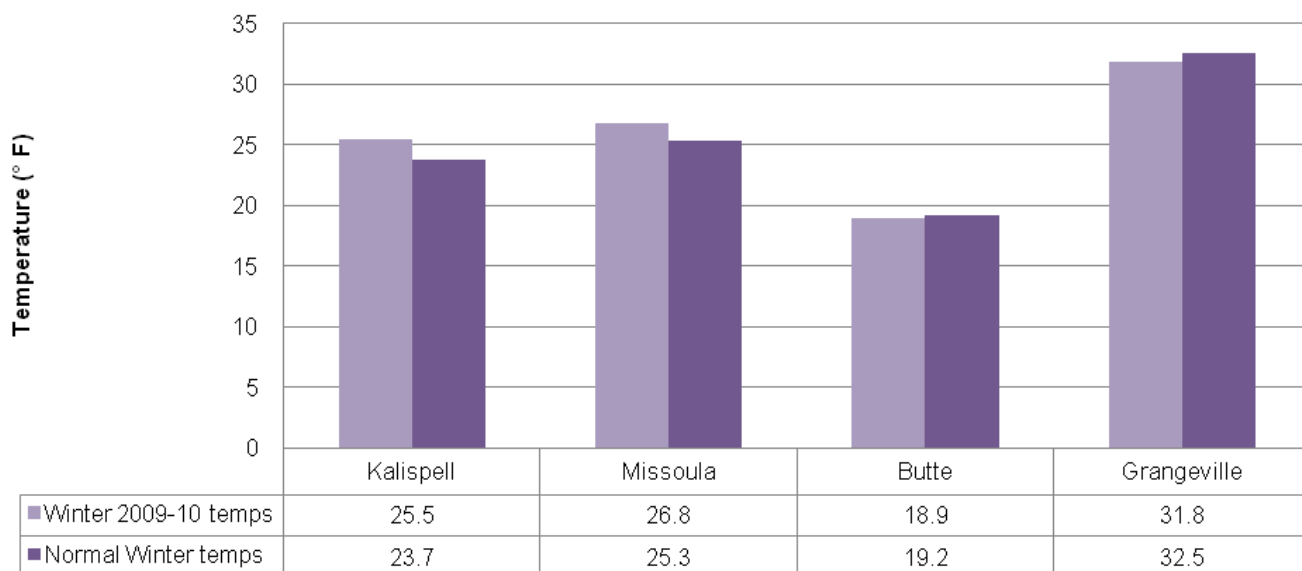
In fact, the weather pattern was so quiet that not a single winter weather headline (warning or advisory) was issued across western Montana and north central Idaho between January 23<sup>rd</sup> and March 8<sup>th</sup>! A very rare occurrence in this part of the country. Valley locations did not fare any better, averaging only about 65% of normal in terms of precipitation.



## Winter Summary 2009-2010 continued.....

Winter seemed to be off to a cold and snowy start in early October when an unusual arctic weather system pushed across the continental divide. Mountain snow and abnormally cold temperatures prevailed, with temperature drops of 20 to 30 degrees over a 2 day period. Mother nature seemed to have other plans however, as El Nino caused a dray and slightly warm winter!

**Normal Winter Temps vs. 2009-10 Observed Temps**



### Spotter Information Contacts

- Jenn Pallister
- Trent Smith

Ph: 406-329-4840

## Storm Prediction Center:

### National Center for Environmental Prediction

The Storm Prediction Center, formerly known as the Severe Weather Warning Center, was established in the early 1950s. A devastating tornado hit Tinker Air Force Base in Oklahoma in March of 1948; five days later, forecasters were able to predict another tornado event near the air base. The accuracy of the prediction received considerable attention, so the Air Force established the National Center to watch for severe weather over the continental United States. The Center has evolved considerably throughout the years, but the fundamental mission of the Storm Prediction Center has remained the same. Today, the Storm Prediction Center resides in Norman, Oklahoma and is part of the National Weather Service. It is a great source of information and guidance for a weather fore-

## Storm Prediction Center continued

caster, offering a centralized effort to predict and coordinate the potential of severe storms or fire weather threats.

The Storm Prediction Center operates similarly to local weather offices. The Storm Prediction Center is staffed twenty-four hours a day, seven days a week with three to five forecasters on a shift. While the local National Weather Service offices forecast for all weather in their

forecast area, the Storm Prediction Centers monitors the potential for severe weather over the U.S. In coordination with local weather offices, the Storm Prediction Center is responsible for issuing tornado and severe thunderstorm watch boxes across the U.S. Severe weather can span across multiple forecast areas, so a centralized unit is needed to ensure consistent distribution of information in the region

affected. The Storm Prediction Center also releases national severe weather and fire weather outlooks each day. For more information on the Storm Prediction Center and the products they issue, please visit

[www.spc.noaa.gov](http://www.spc.noaa.gov).

In following newsletters, we will be discussing other National Centers that keep a watchful eye on the safety of the United States .

**“The Storm Prediction Center operates similarly to local weather offices.”**

## CoCoRaHS-Community Collaborative Rain, Hail, and Snow Network

The Community Collaborative Rain, Hail and Snow Network or CoCoRaHS continues to be an important program in the Northern Rockies. Montana became part of this program in December 2007, and Idaho was added in December 2008. CoCoRaHS was started in 1998 by Nolan Doeskan, Colorado State Climatologist, after the horrible flash flood event that hit Fort Collins, Colorado the previous year. CoCoRaHS is designed to create a high quality dense network of precipitation reports. Volunteers are asked to take daily precipitation reports, but do not worry

CoCoRaHS makes it simple.

They even took into account volunteers taking vacations or who do not want to log in every day during dry periods.

CoCoRaHS partnered with the

National Oceanic and Atmospheric Administration (NOAA) and the National Weather Service since these government agencies utilize the data on a daily basis and have an abundant source of volunteers who are interested in weather and willing to take daily observations.

238 volunteers in Montana and 134 volunteers in Idaho have committed to enter precipitation data for CoCoRaHS. Recently, local county Emergency managers have indicated a desire to see this program continue to expand, especially in their own counties, since the information is utilized for development and planning purposes as well as research. If you are interested to learn more, visit the CoCoRaHS website at [www.cocorahs.org](http://www.cocorahs.org). The site contains all the information and training tools necessary for measuring and recording precipitation for CoCoRaHS. If you have additional questions, please contact Trent Smith at [trent.smith@noaa.gov](mailto:trent.smith@noaa.gov). Finally, to our current observers, thank you for your dedication to this wonderful and useful program.



## Spring and Summer Outlook

The overall climate of winter 2009-10 was primarily influenced by an El Nino that set up in the equatorial Pacific Ocean. The El Nino has continued into spring with water temperatures in the equatorial Pacific Ocean still above normal. The Climate Prediction Center has been and continues to forecast a weakening of the El Nino to neutral conditions by July, 2010.

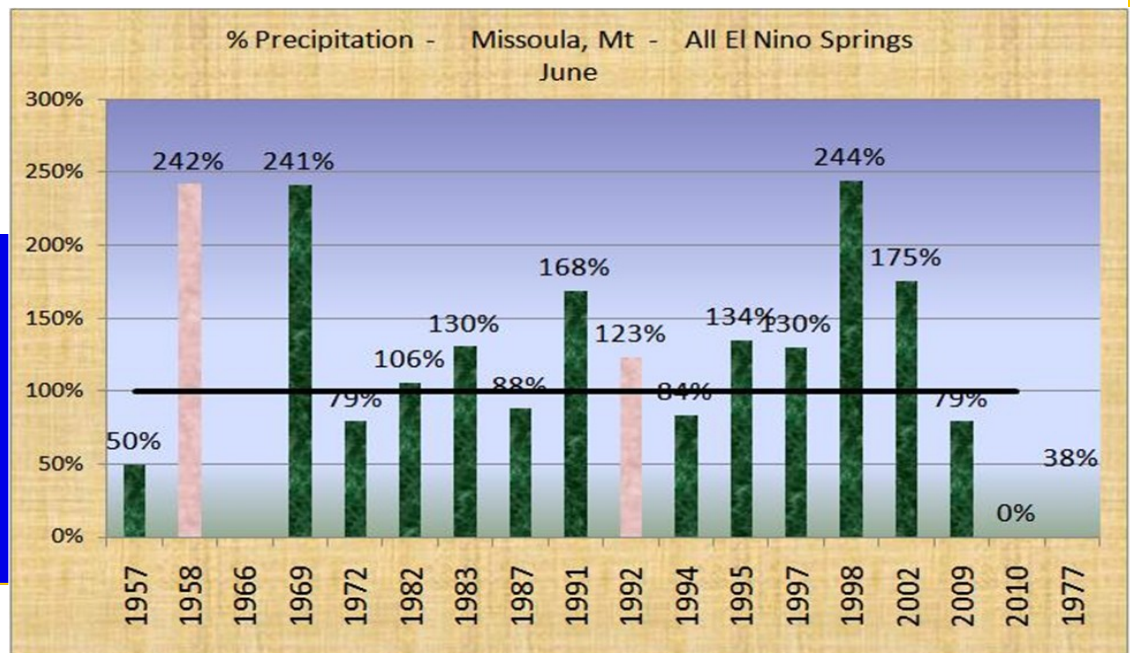
Unlike the winter time, climate signals are weaker with an El Nino event in the spring, summer and autumn. May and June are climatologically the wettest two months of the year, primarily due to a weather pattern that is favorable for more widespread or "all day" type of rainfall events, or if cold enough, snowfalls. Typically these types of patterns are possible through mid June. Then a transition to more of a south-southwesterly flow begins. It is at this time, late June through mid July, that climatology shows the peak of thunderstorms occur.

### What has happened in the past during El Nino's in spring in the Northern Rockies?

Past data for these events were looked at and it was found that:

- Precipitation has been variable in April and May (some wet, some dry)
- Temperatures have been warmer than normal every time there has been an El Nino in May.
- Precipitation during an El Nino in June has been 75% of normal to even 200% of normal.
- Precipitation has been variable in July and August during El Nino neutral conditions. Wetter than normal summers occurred in the 60s through mid 80s. And drier than normal summers occurred in the mid 80s through present day.

Temperatures from the mid 90s through present day have been warmer than the 30 year normal during El Nino neutral phases.



# Spring and Summer Outlook continued

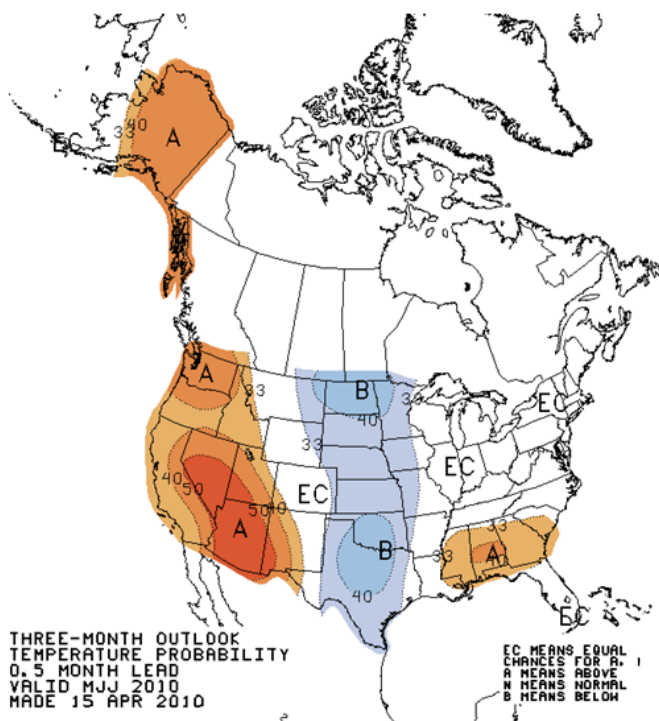
## So what is the forecast for spring and summer??

Variability occurs in spring but there is some confidence with the following:

*Normal to above normal precipitation is expected in June.*

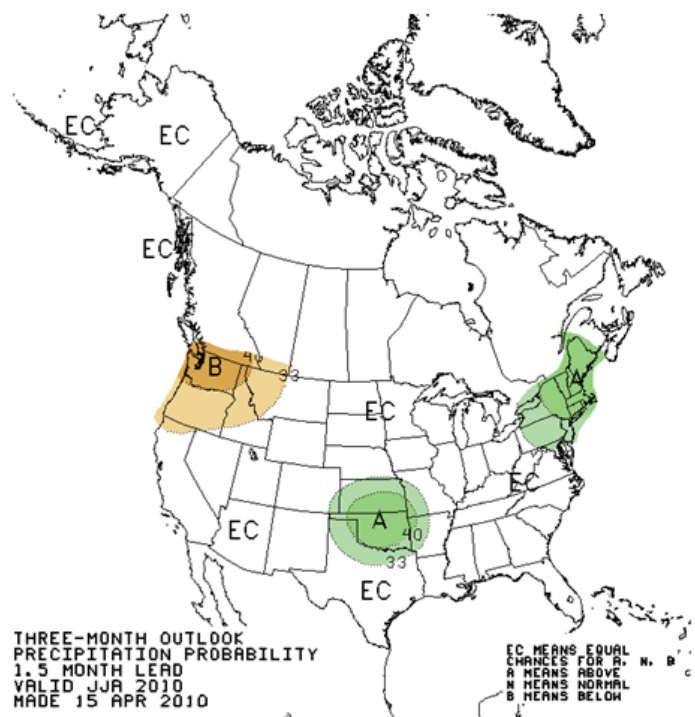
*Warmer temperatures than the 30 year normal expected in July.*

\*\*\*\*The 6-14 day outlook from the Climate Prediction Center is a good way to look at the general trend , or potential weather outlook, especially during the summer months. The link for cpc is [www.cpc.noaa.gov](http://www.cpc.noaa.gov)



**May-June-July  
Temperature  
outlook**

**May-June-July  
precipitation  
outlook**





## Social Media

The National Weather Service is working to keep up with the social media of the 21<sup>st</sup> century. The National Weather Service is developing means to communicate through Facebook, Twitter and Youtube to better reach and serve our spotters and the general public.

Currently, the National Weather Service has a Facebook page. Hopefully, in the next year, individual

**Learn more at [www.weather.gov/stormreports](http://www.weather.gov/stormreports)**

weather offices will too. Facebook is a wonderful way to communicate with others, especially over long distances. The NWS Facebook page allows visitors or friends to receive national and world information about weather, such as **“Want to tour a NOAA hurricane hunter aircraft? Experts will visit five Gulf Coast cities on a hurricane awareness tour.”** or **“NOAA's Operational Significant Event Imagery (OSEI) Web site shows a satellite image (taken by EUMETSAT's Meteosat-9 satellite) of the eruption of the Eyjafjallajokull Volcano in Iceland.”** Once local weather offices are approved to create individual pages, more localized information will be presented. Facebook will also provide weather spotters a medium for training and sending weather reports. For now, check out the National Weather Service page if you have a Facebook account.

The NWS is also experimenting with Twitter. The first of two programs allows the Missoula Weather Office to receive Twitter messages sent in a defined latitude/longitude box if weather related terms are

used in the message. The second program allows you to report severe weather to our local office by downloading an application onto your smart phone. Both programs are still in their infancy but have been utilized in past events with interesting results. If you like to Tweet, the Missoula office will receive your messages about weather.

Finally, the National Weather

Service is researching the use of Youtube by individual offices. Certain regulations must be in place before the NWS can utilize this form of social media. If successfully used, Youtube can prove to be a beneficial method of sharing information between individual offices and our spotters, such as local spotter training presentation videos and visual weather discussions. Hopefully, we will be sharing information on Youtube in the near future.

The National Weather Service hopes to continue to provide information to you, our spotters, in an accessible manner. We will continue to use social media sites to enhance our efforts to communicate with you and the general public. Currently, the best place to find information about the spotter program is at [www.weather.gov/missoula/spotter](http://www.weather.gov/missoula/spotter). At this site, you can find current training presentations, useful documents and the Weather blog. We hope to continue to expand our methods of dispersing information about our local weather office through several media outlets.



# Water Supply and Drought Outlook for Summer 2010

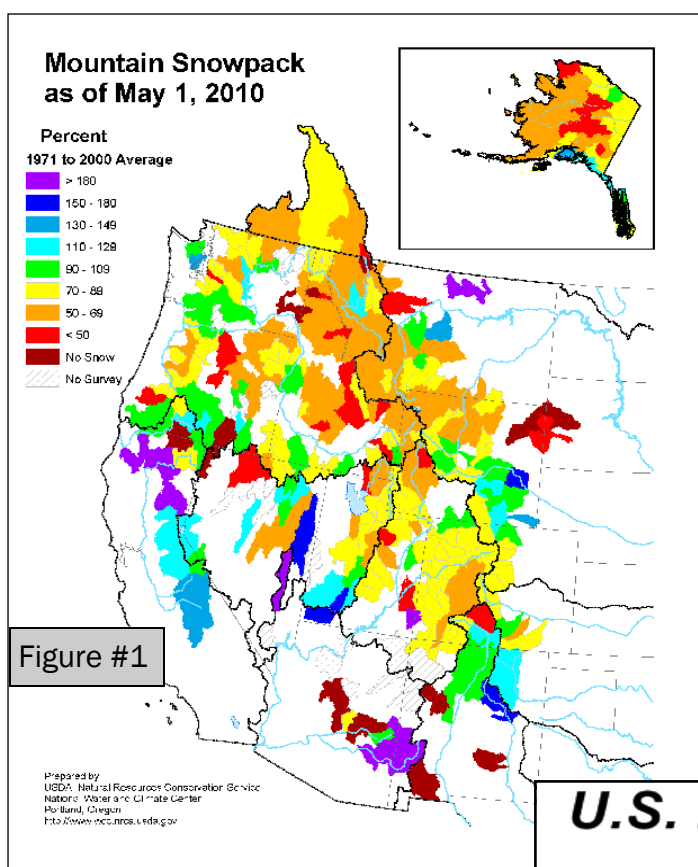
The El Nino winter of 2009-2010 has left much of western Montana and north central Idaho high and dry. Most winter snowstorms avoided the Pacific Northwest and dived into California and the southwest United States leaving the states of California, Arizona and New Mexico with abundant moisture. The lack of moisture in Idaho and Montana has left us with a meager snowpack. Snowpack percent of average values on May 1<sup>st</sup> range from 59 to 89 percent of average across western Montana and north central Idaho. (see figure #1 below)

Some specific snowpack #'s as of May 6 can be seen in the table below:

MONTANA	PERCENT OF AVERAGE
Kootenai River Basin	80
Flathead River Basin	89
Upper Clark Fork River Basin	85
Bitterroot River Basin	59
Lower Clark Fork River Basin	68
IDAHO	
Salmon River Basin	70
Clearwater River Basin	66

## What does the lack of snow mean to us?

Snowpack in the mountains is the life blood to rivers and creeks across the western United States. Water is used for irrigation, power generation, domestic water supply and recreation. The majority of the water that creates creeks and rivers in the west is attributed to snowmelt. With snowpack numbers being fairly low this year, a corresponding lack of water in creeks and rivers will be experienced in the summer of 2010. The lack of water leads to concern for drought across the region. The current United States drought monitor (see Figure #2) has placed much of Idaho and Montana in some form of drought. Severe drought has been designated for the area along the Bitterroot Mountain range that divides part of Idaho and Montana.



For more information on drought in the U.S. see:

<http://www.drought.unl.edu/dm/>

## U.S. Drought Monitor

West

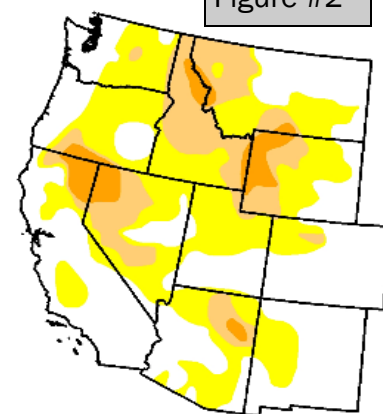
May 4, 2010  
Valid 7 a.m. EST

Figure #2

	Drought Conditions (Percent Area)					
	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	47.5	52.5	19.4	4.9	0.0	0.0
Last Week (04/27/2010 map)	44.9	55.1	19.4	4.9	0.0	0.0
3 Months Ago (02/09/2010 map)	36.6	63.4	18.3	3.3	0.0	0.0
Start of Calendar Year (01/05/2010 map)	40.1	59.9	30.6	9.9	0.5	0.0
Start of Water Year (10/06/2009 map)	42.1	57.9	25.4	8.5	0.0	0.0
One Year Ago (05/05/2009 map)	38.8	61.2	24.6	6.9	0.0	0.0

### Intensity:

■ D0 Abnormally Dry      ■ D3 Drought - Extreme  
■ D1 Drought - Moderate      ■ D4 Drought - Exceptional  
■ D2 Drought - Severe



## Staff Spotlight

**Name:** Michelle Mead

**Position:** Lead Forecaster

**Hometown:** Plymouth, MN (a NW suburb of Minneapolis)

**National Weather Service Background:**

Michelle graduated from St. Cloud State University in 1994 and began her National Weather Service career as an Intern at the Minneapolis, Minnesota office in October 1994. After a year there, she moved to Alpena, Michigan in November 1995. She was involved in helping spin down the Alpena office as an Intern. After her work in Alpena was complete, Michelle moved to Rapid City, South Dakota and worked as an Intern there through October 1998. Michelle was promoted to a General Forecaster and moved to Pendleton, Oregon in October of 1998. In December of 2001, Michelle was promoted to a Lead Forecaster and moved to Missoula.



**Why did you want to become a meteorologist?** As a child, thunderstorms used to SCARE ME TO DEATH! My dad got sick of me crawling into their bed during thunderstorms and took me to the National Weather Service so they could explain to me how thunderstorms formed. I instantly fell in love with the weather! I love my job as it never gets boring and there is always a new challenge to tackle every day!

**What are a few of your other responsibilities in the office?** I am very active in outreach in the office and enjoy everything from talking with the smallest of audiences to large groups. I do a lot of school presentations and love to see the looks on the kid's faces when we do weather experiments, or watch extreme weather videos. I also enjoy talking to community service groups and educating them about the National Weather Service and how we can help them at any time.

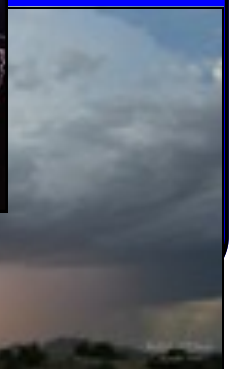
**What do you like to do for fun outside of work?** I love spending time with my family, working out and being outdoors.



By Harold Ed  
Copyright 20



Photo by RW Bird



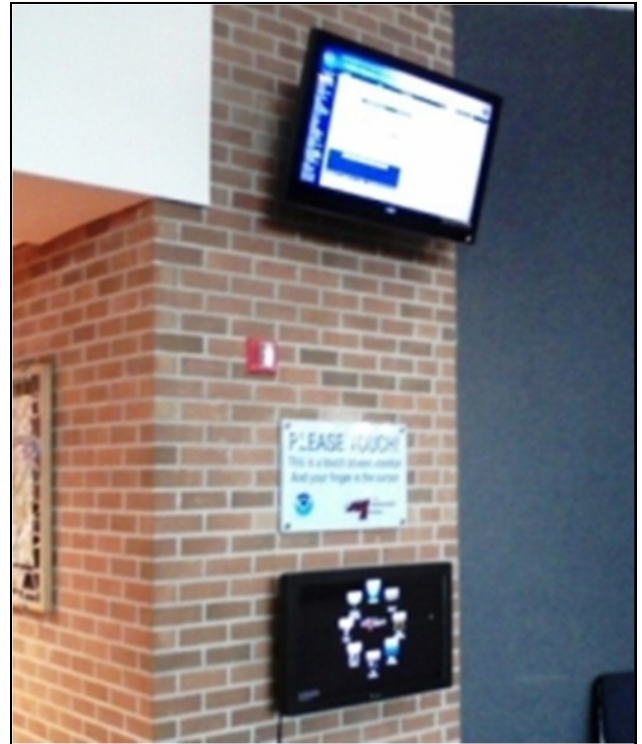
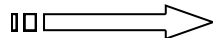


new!

# NOAA'S ARC

## AIRPORT Reference Center Weather and Travel Information

The National Weather Service in Missoula introduces a new way to receive weather information while traveling through the Missoula International Airport. An interactive kiosk has been created to allow access to the National Weather Service website, flight information, flight tracking, driving directions, road conditions, weather trivia, and more! The intent of this system is to educate airport visitors in current weather and road conditions, hopefully allowing for safer travel. This interactive system consists of a touch screen monitor, allowing you to guide the browser with the touch of your finger, as well as a monitor overhead displaying current weather conditions for the airport. The system was funded jointly through the National Weather Service and the Missoula International Airport. We invite you to stop by baggage claim during your next visit to check out this new educational and easy to use system!



Try to unscramble the words below. Good Luck!

Weather

1. aedlbo
3. epshtmeora
5. oimlcylogat
7. mcuusul
9. usntrwobd
11. sihtloean
13. itlgnghin
15. erintpapoitic
17. aaddr
19. petaeetrmru
21. daronto
23. ewtehar

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2. meeenromta
4. ziabrzld
6. cenotvicno
8. mnmcbouulius
10. heneffhrati
12. rosieninv
14. letoyerogmo
16. upersers
18. crlpusele
20. rhdnrotseumt
22. grvia
24. indw

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# National Weather Service

## Missoula Montana

### Spotter Network Reporting Procedures

When you observe or hear of weather conditions that meet or exceed the criteria listed below, telephone your report immediately to the National Weather Service office in Missoula. Our toll-free number is:

**1-800-676-6975\***

- ☛ **High Wind** – 40 mph or more sustained or gusts. (Please use table below to estimate wind speeds.)
- ☛ **Heavy Snow** – Snowfall rates of one inch or more per hour. 6 inches in 12 hours or 8 inches in 24 hours
- ☛ **Dangerous Wind Chills** – Minus 10 degrees or colder. (Please use table below to estimate wind chills)
- ☛ **Freezing Rain** – (falls a rain, freezes on impact)
- ☛ **Visibility** – less than ¼ mile for any reason (e.g. dense fog, smoke)
- ☛ **Heavy Rain** – one half of an inch or more per hour
- ☛ **Flooding** – any kind (e.g. rivers/streams abnormally high, water over roads, debris flows, ice jams)
- ☛ **Damage, Deaths and/or Injuries** that are weather related
- ☛ **Hail** – Any size (Please use table below to estimate hail size.)
- ☛ **Tornado** (on the ground), **Funnel Cloud** (not touching on ground) or **Waterspout** (tornado over water)
- ☛ **Unforecasted weather**

When calling in your report, please tell us briefly:

- ✓ *Who you are and where you are calling from*
- ✓ *What you have seen* (hail, high winds, heavy snow, etc.)
- ✓ *Where you saw it* (i.e. 4 miles West of Missoula)
- ✓ *When you saw it* (the time of your observation)
- ✓ *What it was doing* (movement, damage observed, trends – i.e. snowfall is becoming heavier, etc.)

\*Unlisted number, Only for weather reporting

### Wind Speed Estimates (MPH)

- 25-31 Large branches in motion
- 32-38 Whole trees in motion
- 39-46 Twigs break off trees;  
wind impedes walking
- 47-54 Slight structural damage;  
branches break
- 55-63 Trees uprooted;  
considerable structural  
damage
- 64-74 Considerable structural  
damage
- 75+ Peels surface off roofs;  
windows broken; trailer  
houses overturned



### Wind Chill Chart



		Temperature (°F)																		
		Calm	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
Wind (mph)	5	36	31	25	19	13	7	1	-5	-11	-16	-22	-28	-34	-40	-46	-52	-57	-63	-69
	10	34	27	21	15	9	3	-4	-10	-16	-22	-28	-35	-41	-47	-53	-59	-66	-72	-78
	15	32	25	19	13	6	0	-7	-13	-19	-26	-32	-39	-45	-51	-58	-64	-71	-77	-83
	20	30	24	17	11	4	-2	-9	-15	-22	-29	-35	-42	-48	-55	-61	-68	-74	-81	-87
	25	29	23	16	9	3	-4	-11	-17	-24	-31	-37	-44	-51	-58	-64	-71	-78	-84	-91
	30	28	22	15	8	1	-5	-12	-19	-26	-33	-39	-46	-53	-60	-67	-73	-80	-87	-94
	35	28	21	14	7	0	-7	-14	-21	-27	-34	-41	-48	-55	-62	-69	-76	-82	-89	-96
	40	27	20	13	6	-1	-8	-15	-22	-29	-36	-43	-50	-57	-64	-71	-78	-84	-91	-98
	45	26	19	12	5	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79	-86	-93	-100
	50	26	19	12	4	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81	-88	-95	-102
	55	25	18	11	4	-3	-11	-18	-25	-32	-39	-46	-54	-61	-68	-75	-82	-89	-96	-103
	60	25	17	10	3	-4	-11	-19	-26	-33	-40	-48	-55	-62	-69	-76	-84	-91	-98	-105

Frostbite Times

30 minutes

10 minutes

5 minutes

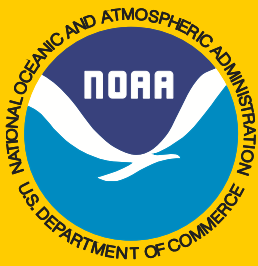
Wind Chill (°F) =  $35.74 + 0.6215T - 35.75(V^{0.16}) + 0.4275T(V^{0.16})$

Where, T= Air Temperature (°F) V= Wind Speed (mph)

Effective 11/01/01

### Hail Size Estimates (Inches)

- Pea.....1/4
- Penny.....3/4
- Nickel.....7/8
- Quarter.....1
- Half Dollar....1 ¼
- Ping Pong.....1 ½
- Golf Ball.....1 ¾
- Lime.....2
- Tennis Ball.....2 ½
- Baseball.....2 ¾
- Soft Ball.....4



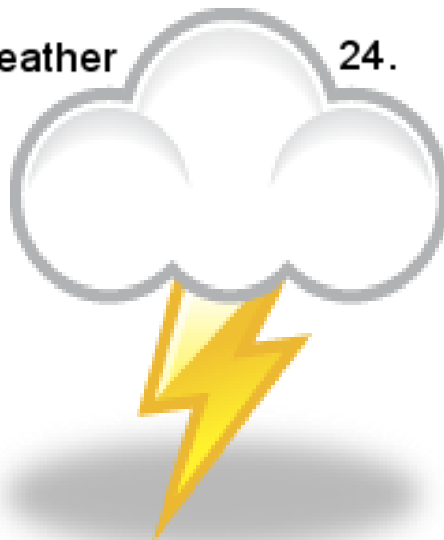
Don't forget  
to check out  
our blog and  
other  
weather  
information  
at:

[www.weather.gov/missoula](http://www.weather.gov/missoula)



## KEY: Weather

- |                   |                  |
|-------------------|------------------|
| 1. albedo         | 2. anemometer    |
| 3. atmosphere     | 4. blizzard      |
| 5. climatology    | 6. convection    |
| 7. cumulus        | 8. cumulonimbus  |
| 9. downburst      | 10. fahrenheit   |
| 11. hailstone     | 12. inversion    |
| 13. lightning     | 14. meteorology  |
| 15. precipitation | 16. pressure     |
| 17. radar         | 18. supercell    |
| 19. temperature   | 20. thunderstorm |
| 21. tornado       | 22. virga        |
| 23. weather       | 24. wind         |



**Spotter Training Calendar—** <http://www.wrh.noaa.gov/mso/spotter/SpotterCalendar.htm>